

Advanced Computer Simulation Approaches for Soft Matter Sciences III

"Soft matter" is nowadays used to describe an increasingly important class of materials that encompasses polymers, liquid crystals, molecular assemblies building hierarchical structures, organic-inorganic hybrids, and the whole area of colloidal science. Common to all is that fluctuations, and thus the thermal energy kT and Boltzmann entropy, play an important role. "Soft" then means that these materials are in a state of matter that is neither a simple liquid nor a hard solid of the type studied in hard condensed matter, hence sometimes many types of soft matter are also named "complex fluids." Soft matter, either of synthetic or biological origin, has been a subject of physical and chemical research since the early finding of Staudinger that long chain molecules exist. From then on, synthetic chemistry as well as physical characterization underwent an enormous development. One of the outcomes is the abundance of polymeric materials in our everyday life. Nowadays, methods developed for synthetic polymers are being more and more applied to biological soft matter. The link between modern biophysics and soft matter physics is quite close in many respects. This also means that the focus of research has moved from simple homopolymers to more complex structures, such as branched objects, heteropolymers (random copolymers, proteins), polyelectrolytes, amphiphiles and so on.

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